

## CLAIMS

What is claimed is:

1. A catalytic converter comprising:  
a catalyst substrate comprising a catalyst, and having a first lip  
concentrically disposed about a first end of said catalyst substrate, a second  
lip concentrically disposed about a second end of said catalyst substrate, and  
5 an outer surface having at least one concentric structural feature disposed  
therebetween, wherein an outer surface diameter is less than or equal to a  
first lip diameter;  
a shell having an opening, and concentrically disposed around  
said catalyst substrate; and  
10 a first mat support material disposed between said catalyst  
substrate and said shell, concentrically around said catalyst substrate,  
between said first lip and said structural feature.
2. A catalytic converter recited in Claim 1, wherein said  
first lip and said second lip are continuous annular lips.
3. A catalytic converter recited in Claim 1, wherein said  
first lip and said second lip are segmented annular lips.
4. A catalytic converter recited in Claim 1, wherein said  
structural feature is selected from the group consisting of ribs, ridges, and  
protrusions.
5. A catalytic converter recited in Claim 1, wherein said  
structural feature comprises a continuous annular geometry.

6. A catalytic converter recited in Claim 1, wherein said structural feature comprises a segmented annular geometry.

7. A catalytic converter recited in Claim 1, wherein said structural feature has a diameter equal to or smaller than the first lip diameter.

8. A catalytic converter recited in Claim 1, further comprising a second mat support material disposed between said structural feature and said second lip.

9. A catalytic converter recited in Claim 8, wherein said shell further comprises a U-shaped attachment concentrically disposed between said shell and said structural feature.

10. A catalytic converter recited in Claim 9, wherein sides of said U-shaped ring contact edges of said mat support material.

11. A catalytic converter recited in Claim 1, wherein said shell further comprises a first annular shoulder disposed concentrically and circumferentially about said shell adjacent said first lip.

12. A catalytic converter recited in Claim 11, further comprising said shell have a second annular shoulder disposed concentrically and circumferentially about said shell adjacent said second lip.

13. A catalytic converter recited in Claim 1, wherein said shell further comprises at least one depressed annular area concentrically and circumferentially disposed about said shell, and coinciding with said structural feature.

14. A catalytic converter recited in Claim 13, further comprising an annular gap disposed between depressed annular area, said mat support material, and said structural feature.

15. A catalytic converter recited in Claim 14, wherein said depressed annular area is intermittently depressed around said shell.

16. A catalytic converter recited in Claim 15, wherein said intermittent depressions coincide with said structural feature which is intermittent.

17. A catalytic converter recited in Claim 1, further comprising a mat protection ring concentrically disposed within said shell, concentrically around an end of said catalyst substrate.

18. A catalytic converter recited in Claim 1, further comprising an endcone, endplate, or exhaust manifold, disposed at one or more ends of said shell.

19. A catalytic converter recited in Claim 1, further comprising a mat support material disposed between said catalyst substrate and said shell, concentrically around said catalyst substrate, between said first lip and said second lip, and over said structural feature.

20. A catalytic converter recited in Claim 19, wherein said mat support material further comprises a depressed surface, wherein said mat support material depressed surface substantially aligns and coincides with said structural feature.

21. A catalytic converter recited in Claim 20, wherein said mat support material has a substantially uniform mount density.

22. A method of manufacturing a catalytic converter comprising:

forming a catalyst substrate comprising a catalyst, said catalyst substrate having a concentric first lip and a concentric second lip  
5 with an outer surface concentrically disposed therebetween, wherein an outer surface diameter is less than or equal to a first lip diameter;

forming at least one structural feature concentrically about said outer surface;

10 disposing a first mat support material between said first lip and said structural feature;

disposing said catalyst substrate and said mat support concentrically within a shell having an opening; and

disposing an endcone, endplate, or manifold on at least one end of said shell.

23. A method recited in Claim 22, further comprising forming at least one shoulder concentrically around said shell, adjacent to said structural feature.

24. A method recited in Claim 23, wherein said forming said shoulder further comprises using a stamping die and/or a crimping device.

25. A method recited in Claim 22, wherein said forming said catalyst substrate further comprises:

extruding an extrudite of said catalyst substrate; and  
squeezing said outer surface to form said structural feature.

26. A method recited in Claim 22, wherein said forming said catalyst substrate further comprises:

extruding an extrudite of said catalyst substrate; and  
applying a ceramic paste to form said structural feature on  
5 said outer surface.

27. A method recited in Claim 22, wherein said forming said catalyst substrate further comprises:

extruding an extrudite of said catalyst substrate; and  
removing a portion of said outer surface of said catalyst  
5 substrate to form said structural feature.

28. A method recited in Claim 22, further comprising:  
sizing compressively said shell about said mat support  
material and said catalyst substrate.

29. A method recited in Claim 22, further comprising disposing a mat support material having a depressed surface between said first lip and said second lip, and over said structural feature.

30. A method recited in Claim 29, wherein said disposing further comprises substantially aligning and coinciding said mat support material depressed surface with said structural feature.

31. A method recited in Claim 30, wherein said mat support material has a substantially uniform mount density.